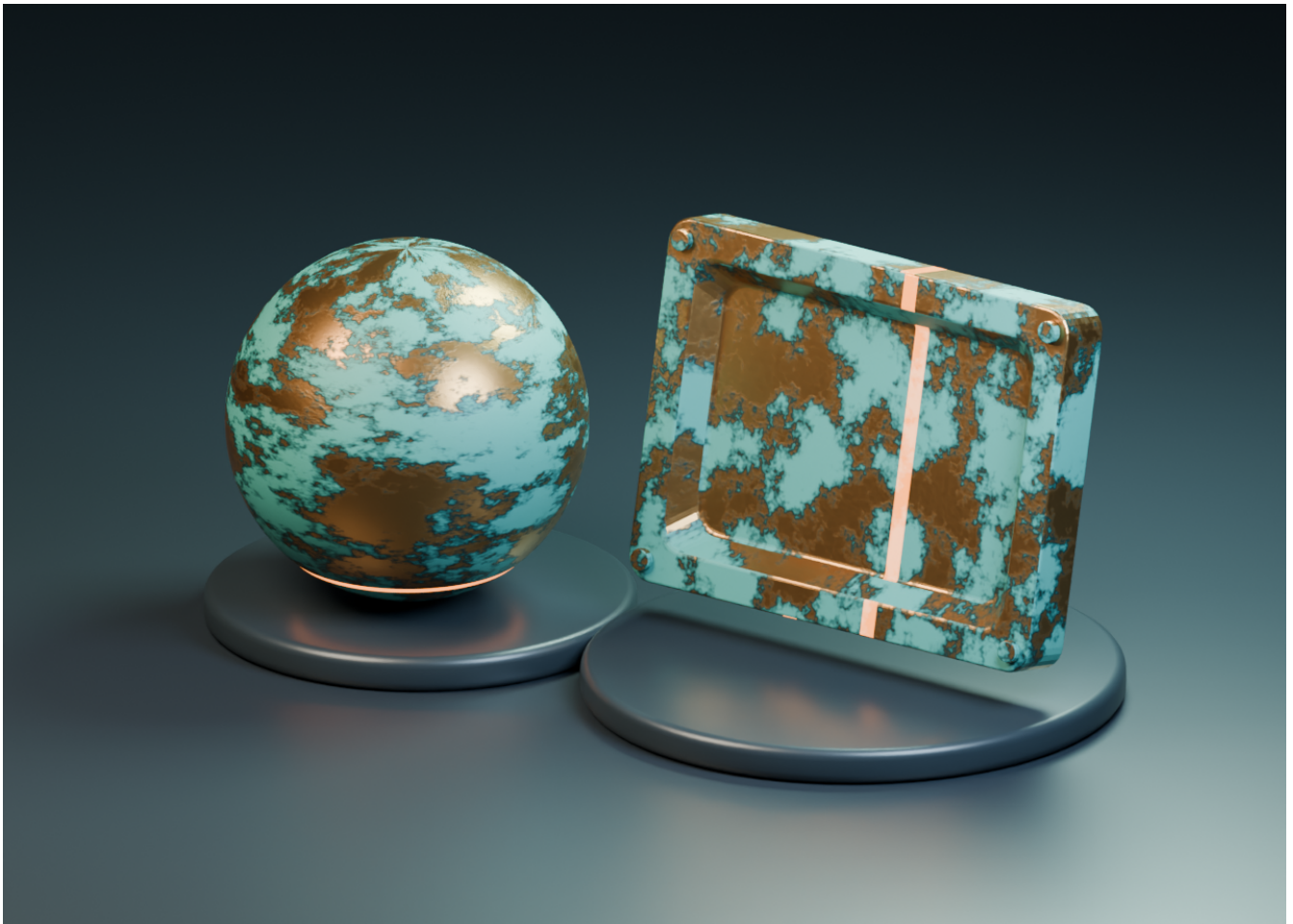


Procedural Bake Bridge

From procedural materials to organized PBR textures



Analyze / Bake / Pack / Preview

Six delivery presets. Material and Object UV workflows. Local processing.

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Start with the final maps

The preset defines what will be delivered. You can inspect the channel layout before starting the bake.

01

Choose a source

Sample a supported material on a plane, or bake a mesh using its UVs.

02

Choose a preset

The Maps panel switches to the actual final textures for that target.

03

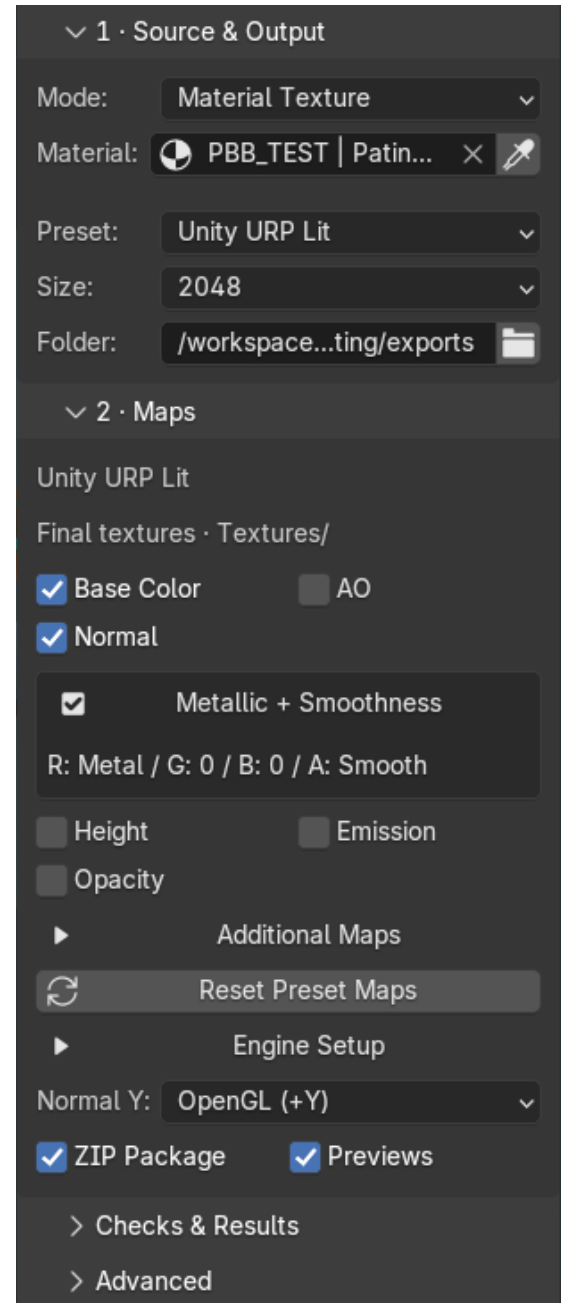
Review the output

Unity URP combines Metallic in R and Smoothness in A. Separate AO is optional.

04

Analyze, then Bake

Review blockers, run the export and inspect the saved textures with Validate or Preview.



Actual Blender 4.5 interface. Example configuration: Unity URP Lit.

Install or update

Minimum Blender: 4.5.0 LTS. Save your work, close Blender, install `procedural_bake_bridge-1.0.0.zip` through Preferences > Add-ons > Install from Disk, then restart Blender. Confirm 1.0.0 in N > PBB > Help & About. Install only the extension ZIP, not Complete or Source.

The six built-in presets, custom JSON presets, queue recipes, channel formats and export features remain available. Resolution, output folder and quality remain unchanged by preset selection. A preset change restores its map defaults. Saved recipes retain their explicit settings. The previously removed Marketplace preset stays removed; old selections migrate to Generic PBR while preserving the normal convention.

Your first bake

1. Open the supplied Blender 4.5 procedural test file. Select its `01_PBB_PANEL_UV` mesh.
2. In **1 - Source & Output**, select **Object UV Bake** and **Require Existing UVs**. Choose Generic PBR, 512 pixels and a writable output folder.
3. In **2 - Maps**, enable the desired maps. The supplied test material exercises the original eight channels in Object UV mode. Smoothness can be derived from its Roughness; Coat maps read the material's coat values (possibly constant). For Height, set node `PBB_HEIGHT_SOURCE`, output `Value`.
4. Click **Analyze**. Fix any blocking issue shown at the top. **Checks & Results** contains the full report.
5. Click **Bake**. Watch the progress bar, current stage/source and elapsed time. The operation uses a snapshot taken when it starts.
6. After completion, expand **Checks & Results**. Use **Open Folder**, **Validate**, **Preview** or **Report**.

Begin at 512 pixels with Render Previews disabled. Enable previews or choose a larger resolution after checking the first result. The supplied file was saved natively in Blender 4.5; newer Blender saves are not guaranteed to reopen correctly in older versions.

A smaller interface

Section	Purpose
Top controls	Analyze, Bake, live progress, Cancel and immediate blockers
1 - Source & Output	Mode, source, output preset, resolution and folder
2 - Maps	Final texture selection for the chosen preset, packed checkboxes and engine setup
Checks & Results	Concise diagnostics, last package, Validate, Preview, folder/report access
Advanced	Custom profiles, quality, formats, source/output details and reset
Batch & Recipes	Queue, per-job overrides, retry, recipe files and batch ZIP
Help & About	Guide, runtime log and abandoned-workspace cleanup

Checks, Advanced, Batch and Help start collapsed. **Full Diagnostics** reveals detailed graph/channel messages. **Detailed Results** reveals map-by-map results. These controls only change visibility; they do not discard settings or omit processing.

Progress and cancellation

Analyze, Bake, Validate and Preview run in a separate local Blender process. The foreground Blender instance polls progress while its interface remains available. No Python background thread calls Blender APIs, and nothing is uploaded or sent to a service.

The percentage describes **completed processing steps**, not estimated remaining time or Cycles sample percentage. Stages include source checks, copy preparation, baking a map, saving, file validation, channel packing, preview rendering, mesh delivery, cleanup and package writing. The current stage and elapsed clock keep updating while a long step runs. Several fast checks may finish between two UI updates.

The first step prepares a private scene snapshot. Large scenes or edited images can briefly pause Blender during this initial copy; additional memory and temporary disk space are needed. Unsaved edits to ordinary image pixels are copied to the worker. Edits made after launch apply to the next operation. External resource references are absolute. Automatic execution of embedded Python scripts is disabled in the worker; materials requiring custom scripted drivers may need to be simplified or baked in their original environment.

Click **Cancel** or press **Esc**. A native Cycles render or current file-processing step must finish before safe cleanup. The panel shows that cancellation is pending; it does not report success or jump to 100%. Already completed packages remain valid. The interrupted package is retained with failure/cancellation diagnostics when available. Loading another file or disabling the addon requests worker cancellation without retaining removed Operator RNA. Worker cleanup continues locally at the next safe boundary.

A forced OS termination cannot guarantee cleanup. Abandoned private temporary folders may remain after a crash. The extension's workspace cleanup tool concerns owned Blender datablocks, not arbitrary disk folders.

Choose the right mode

Material Texture samples a material on a calibrated plane. Use it for portable texture sets from supported procedural graphs. UV sampling is the default; Generated, Object, Geometry and view-dependent coordinates may change appearance on a different object. The addon does not automatically certify that a material is seamless.

Object UV Bake evaluates a mesh and bakes into its UV layout. Existing source UVs are preserved. The default output contains textures only and requires existing usable UVs. To bake an object without UVs, either unwrap it first, or disable Require Existing UVs and enable **Advanced > Output Options > Include Baked Mesh**. The latter generates Smart UVs on a temporary copy and adds an optional Meshes folder containing a static evaluated .blend mesh with embedded baked textures. Append that object to retain the generated UVs. Source UVs are never changed. This is not high-poly-to-low-poly cage transfer and does not export UDIM sets.

For a named Object or Material field, that source takes priority. An empty Object field uses selected meshes. An empty Material field uses selected objects' materials. Add All in the queue deliberately collects all relevant sources; check the queue before starting it.

Ambient occlusion without confusion

Geometric AO depends on object shape. Material Texture mode cannot derive meaningful geometry AO from its isolated flat sample. If AO is selected without a supplied image, **Require All Selected Maps** blocks that combination.

Use **Turn Off AO** to keep Material Texture mode, or **Use Object UV** to bake the active mesh. These are explicit choices; the addon does not silently change your maps. Alternatively, enter a Supplied AO Image under Advanced > Source Options. In Object UV mode, geometry AO covers the isolated evaluated object, not surrounding scene occluders.

Allow Neutral AO in Packs permits a declared constant fill where an engine's packed map needs AO but no meaningful AO is present. It does not supply a real standalone AO map or resolve the strict material-AO requirement. If Require All Selected Maps is disabled, unsupported maps are omitted and the package is marked PARTIAL.

Maps and useful settings

The following are supported material signals. A preset may combine several signals into one final texture; the Maps panel shows the files that will be delivered.

Signal	Interpretation and precision
Base Color	Supported material color input, without baked studio lighting; PNG8 with sRGB RGB encoding
Roughness	Linear scalar data; PNG16 by default
Smoothness	Linear 1 - Roughness, extracted from the supported graph; PNG16 by default
Metallic	Linear scalar data; PNG16 by default
Tangent Normal	Tangent-space baked normal, including supported Bump; OpenGL or DirectX green convention
Height	Explicit scalar source, not automatic geometric displacement; EXR32 by default
Ambient Occlusion	Isolated-object geometry AO or a supplied image
Opacity	Supported alpha signal; optional linear alpha in Base Color
Emission	Supported color and strength; linear HDR EXR32 by default
Coat Mask	Principled Coat Weight; linear PNG16 by default
Coat Smoothness	Linear 1 - Coat Roughness; PNG16 by default

Height Node and Height Output Socket identify an explicit source. Empty values allow unambiguous supported Bump Height detection. Advanced > Source Options contains raw minimum/maximum, normalization and inversion. The addon never invents a normalization range. A flat Alpha=1 material

correctly produces white opacity over covered UV texels. Transmission/refraction is not equivalent to alpha.

Advanced > Advanced Controls contains scalar precision, bake padding, Cycles samples, CPU/device behavior and seam-warning threshold. GPU/Automatic selections continue to use the documented CPU fallback. Seam measurements are diagnostics, not a universal seamless certificate. 8K can use substantial memory; one RGBA float buffer alone is about 1 GiB.

Advanced > Per-map Formats offers PNG8, PNG16, EXR16 and EXR32 for separate outputs, and one Packed PNG Precision setting for packed textures. PNG output clamps values outside 0..1 and reports it; EXR preserves HDR data. The included test material can produce a tiny normal-channel excess around 1.00001, reported as numeric clamping. Import Base Color as sRGB and scalar/normal/packed maps as data in your target engine.

All six delivery presets

Changing **Preset** now selects the appropriate maps, packing and default normal convention. Size, output folder, samples and per-map format choices are preserved. **Reset Preset Maps** restores the selected preset without changing those settings. Selecting a built-in preset clears an active custom JSON override.

Preset	Default final textures in Textures/
Generic PBR	Base Color, Roughness, Metallic, Normal.
Unreal ORM	Base Color, Normal, ORM (R AO, G Roughness, B Metallic, A 1). DirectX normals.
glTF Metallic Roughness	Base Color, Normal, Metallic-Roughness (G Roughness, B Metallic; R/A 1); separate AO when available.
Unity URP Lit	Base Color, Normal, Metallic + Smoothness (R Metallic, A Smoothness; G/B 0); separate AO when available.
Unity URP Complex Lit	Base Color, Normal, Metallic + AO + Smoothness (R Metallic, G AO, B 0, A Smoothness), Clear Coat (R Mask, G Coat Smoothness, B 0, A 1).
Unity HDRP Lit	Base Color, Normal, Mask Map (R Metallic, G AO, B Detail Fill, A Smoothness).

AO is selected by engine defaults in Object UV mode, or when a supplied AO image exists. Without AO in Material Texture mode, compatible packed slots use the explicit neutral AO fill (default 1); URP Lit and glTF omit the separate AO texture. A manually enabled AO channel still follows the checks described earlier. Changing source mode updates default AO only while the map selection is still the preset default; a customized selection is preserved.

2 - Maps selects final texture files. Each packed texture has its own checkbox and RGBA layout. Disable ORM, Metallic/Smoothness, Mask Map or Clear Coat to omit that output and its otherwise unused inputs. All final files go into **Textures/**; there is no Packed folder and no duplicate Metallic, Roughness, Smoothness or Coat source files. These source signals are calculated internally, validated, used for previews and then discarded. Generic PBR continues to export separate maps. Reset Preset Maps restores the complete default set.

Smoothness = 1 - Roughness in linear space, not an sRGB inversion. The same rule applies to Coat Smoothness. For URP, set Smoothness Source to Metallic Alpha and its multiplier to 1. Assign the Complex Lit main packed image to both Metallic and Occlusion; enable Clear Coat and assign its separate RG pack to the Coat Mask slot. For HDRP, import the Mask Map with sRGB off and use neutral remap ranges. Detail Fill is an explicit constant controlling a separately authored detail layer.

Engine Setup contains import instructions. OpenGL normals are used by the Unity and glTF defaults; Unreal defaults to DirectX. Import normals as normal maps and scalar/packed textures with sRGB off. ORM is this addon's Unreal convention, not a mandatory Unreal texture layout.

Height, Emission and Opacity remain optional. Enabling Opacity for Unity or glTF also enables its Base Color alpha routing; it is distinct from Smoothness in the packed mask alpha. When Base Color alpha is used, no duplicate Opacity file is delivered. Disable that alpha option to export standalone Opacity. Height requires target shader setup; glTF core has no standard height texture slot. glTF exports textures, not GLB, and its default HDR EXR emission source must be converted/normalized to an accepted image with suitable emissive factors or extensions. No automatic engine project, material asset, specular-workflow conversion or cross-engine visual match is promised. Coat tint, coat IOR and separate coat normals require manual setup.

Additional Maps offers other supported signals that are not already represented by the preset packs. To export separate Metallic/Roughness/Smoothness files, select Generic PBR. Explicit recipes retain their source channel choices and disabled packed outputs; delivery still follows the chosen preset. Old Unity scene settings with Roughness are migrated to Smoothness once, preserving extras and formats; old recipes/custom mappings can still pack inverse Roughness, without a second inversion if Smoothness is already supplied.

Custom JSON under Advanced overrides the built-in selection. Save Preset writes settings and mappings to a new file; Load Preset validates before applying. Existing files are not silently overwritten. HDRP detail fill, neutral AO value, filename template and preview options remain under Output Options. Filename templates must include distinct channel names to avoid collisions.

Batch and reusable recipes

Add Selected or Add All to the queue. Reorder, remove or clear entries as needed. Each entry stores its source name and mode; enable Override Global Settings for a different name, resolution, output folder or map set. Loaded recipes preserve full settings and explicit overrides.

Analyze Queue checks every entry. Bake Queue processes them serially. Continue After Failed Job controls failure isolation. Retry Failed selects failed, blocked, partial and cancelled entries. Create Batch ZIP bundles successfully completed output folders and a batch report. Per-package ZIP remains independent.

Save Recipe and Load Recipe use validated JSON, not executable scripts. Sources are resolved by name in the current scene snapshot. A recipe does not contain the source artwork; retain the original blend and its resources. Sampling frame is recorded for reproducibility, without claiming bitwise parity across hardware or Blender versions.

Validate and inspect results

Validate checks the actual saved maps, dimensions, precision, numeric ranges and available packed-map relationships. It runs with progress and returns PASS, PASS_WITH_WARNINGS or FAIL. A missing file or invalid package produces an explicit error, not a successful result. File checks do not certify visual parity in Unity, Unreal or another renderer.

Preview reconstructs the material from the exported maps and writes to a new `Render_vNNN` folder, preserving earlier previews. Material previews include sphere, plane and repeat views. Object previews use the named original object. Source Comparison adds matched source renders where supported. Object/Generated-coordinate and view-dependent materials can legitimately differ after isolation.

The default export contains exactly three entries:

Entry	Contents
Textures/	Only the selected final textures, including engine packed maps.
Previews/	Rendered checks; the folder remains empty when Previews is off. Later renders use <code>Render_vNNN</code> subfolders.
Report.txt	Readable export summary, channel layouts, warnings, usage notes, SHA-256 hashes and complete technical metadata.

Keep `Report.txt` with the textures. Its final `PACKAGE DATA` section allows Validate and Preview to reopen a moved package; do not edit or remove this section. Older packages with `Reports/manifest.json` are still supported. The report's checksums describe files at export time; later preview renders do not rewrite the original export report or ZIP.

Validate rechecks final packed samples against export-time fingerprints. Preview reconstructs scalar inputs from packed channels in a private temporary directory without adding duplicate textures. Report opens the text in Blender. Include Baked Mesh is off by default; explicitly enabling it in Object UV mode adds a fourth entry, `Meshes/`.

Failed or cancelled exports are clearly labeled and retain a single `Report.txt` with the failure details where writing remains possible. Never treat a `FAILED` or `PARTIAL` package as a complete texture set. Per-package ZIP mirrors the delivered folder, including an empty Previews folder. Batch ZIP also contains `Batch_Report.txt`.

The software license does not grant rights to source materials or artwork. Provide your own asset usage terms when delivering textures to others.

Troubleshooting

A `BLOCKED Analyze` result means a requirement needs attention; see the top message or Checks & Results. For material AO use one of the direct fixes. For missing UVs, supply the requested map, or enable Include Baked Mesh together with temporary Smart UV generation. For missing Height, identify a supported scalar output. For a packed-source blocker, use Reset Preset Maps or toggle the affected packed texture off and on to restore its required inputs. Advanced > Source Options > Use AO Source controls a supplied or geometry AO input.

For unexpected failures, click **View Runtime Log**. The log preserves original errors alongside cleanup errors. Check output-folder permissions and available disk space. Background Blender must be available at the executable path of the running installation; local security software may block child process launch. The worker never silently falls back to a frozen synchronous UI.

A previous result is a snapshot of the settings and source at the time it ran. Analyze again after changes. Repeated Cancel is safe. Cleanup does not delete user objects or unrelated data. Include `Report.txt` and the runtime log with bug reports, removing private paths if necessary.

Frequently asked questions

Are procedural maps automatically tileable? No. The graph and its coordinates must be periodic across the tile boundaries. A continuous 3D noise field does not necessarily repeat at the edges of a square sample. Use the repeat preview to inspect seams; Object UV atlases are intended for their matching mesh.

Why is there no separate Smoothness file in Unity? The preset puts Smoothness in the alpha channel of Metallic/Smoothness or Mask Map. Select Generic PBR if you need a separate scalar file.

Can I delete Report.txt after baking? The textures remain ordinary images, but the addon needs the report's package data to Validate or generate further previews. Keep it with the export.

Will an engine preset create a Unity or Unreal material asset? No. The preset prepares texture files, packing and normal convention. Import them and connect the appropriate shader slots in the target application.

Verification scope

Consult TEST_REPORT.md and the source archive's evidence for executed tests, exact Blender versions and known limits. Current validation uses Linux CPU. Windows, macOS and GPU are not directly qualified on this host. Future Blender releases are compatibility targets, not automatically tested versions. Tested release: 1.0.0. See the accompanying test report for measured coverage.

Author and support

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